REFRIGERANTS / MOTOR VEHICLE AIR CONDITIONING SERVICE

HAZARDS & RULES

Base Materials - Hazards and Impacts

Motor vehicle air conditioning systems (MVAC) have historically used the refrigerant CFC-12 (also known as Freon or R-12). R-12 is a chlorofluorocarbon that has been identified as causing damage to the ozone layer, which protects the earth from harmful ultraviolet radiation. A new refrigerant called HFC-134a (also known as R-134a) is being used in all new vehicles. R-134a is a hydrofluorocarbon, which is less harmful to the stratospheric ozone layer, but does attribute to global warming.

In addition to causing environmental degradation, R-12 and R-134a can present a hazard to human health when they are improperly handled or accidentally released into a poorly ventilated area. These refrigerants displace oxygen in the air, which makes breathing difficult and could result in asphyxiation. Therefore, when working with or storing air conditioning refrigerants, always do so in well ventilated areas in case of an accidental release.

Some mixtures of air and R-134a have been shown to be combustible at elevated pressures, which presents a second health hazard. Under no circumstances should equipment be pressure tested or leak tested with mixtures of air and R-134a. Similarly, compressed air must not be used for leak detection in R-134a systems.

Refrigerant blends are also on the market. Blends are a mixture of several chemicals and are designed to emulate the characteristics of R-12. In addition to presenting many of the same environmental and health hazards as R-12 and R-134a, blends present their own unique set of difficulties.

Additives and Contaminants - Hazards and Impacts

As discussed above, R-12 and R-134a are the refrigerants used in the majority of MVAC systems, but a number of refrigerant blends are also available for use. There are several problems associated with refrigerant blends.

When blends are mixed with R-134a or R-12, the resulting mixtures cannot be recycled. When R-12 is contaminated with a blend (or with pure R-134a), not only can the mixture not be recycled, it must be managed as a hazardous waste. Because blends should not be mixed with R-134a or R-12, a separate recovery machine is needed specifically for blends.

Another problem with blends is that identifying and recovering blend refrigerants is more difficult than working with straight R-12 or R-134a. Refrigerants in your customers' MVAC systems should be tested prior to removal (use a refrigerant diagnostic tool) to determine if the system contains a specific blend or a "mystery" mixture of refrigerants. You should also check your recovery machine to ensure that it can accept the refrigerant that you plan to recover. Recovering incompatible refrigerants into your recovery machine could cause damage to your machine.

And lastly, when a blend leaks out of an MVAC system, the various components of the blend do not leak at the same rate. The result is that: 1) you may not effectively top off an MVAC system because the mixture will not be in the correct proportions; and 2) blends cannot be recycled on-site and, therefore, must be sent to an off-site reclaimer.

Regulatory Overview

The 1990 Clean Air Act Amendments required the phase out of CFC-based refrigerants used in MVAC systems, and stopped the production and importation of CFCs in 1995. The U.S. EPA regulates MVAC refrigerants and requires that they be recycled either on-site or sent to an EPA certified reclaimer. Shops that service MVACs must use EPA-approved recovery or recovery/recycling equipment and must have their technicians trained by an EPA-accredited training program (note that EPA certified equipment and training is not yet available for all refrigerants.) As mentioned previously, IDEM regulates contaminated R-12 refrigerant mixtures as a hazardous waste.

MANAGEMENT RESPONSIBILITIES

As the shop manager or owner, you can ensure your shop's compliance with EPA regulations by adhering to the following management practices. Also listed are suggested practices that you should follow in order to ease your regulatory requirements and improve the environmental health of your shop.

You Must:

- never intentionally vent refrigerants to the atmosphere.
- recover all refrigerants used in MVAC systems prior to beginning to work on the system.
- have all MVAC service technicians trained and certified by an EPA-accredited training program in the proper use of refrigerant recovery/recycling equipment.
- use only EPA-approved recovery or recovery/recycling equipment to handle refrigerants.
- submit an MVAC equipment owner certification form to the EPA prior to commencing MVAC service operations (only one certification is required regardless of the number of units that your shop has.) See Attachment M for a copy of this form.
- not top-off leaking MVAC systems with a refrigerant other than what is currently present in the system.

- ! either recycle R-12 on-site or sell (or give) recovered R-12 to an EPA-certified refrigerant reclaimer. If your R-12 is sent to a reclaimer, you must retain the name and address of the reclaimer.
- ! handle R-12 that has been mixed with other refrigerants as a hazardous waste.
- ! show proof of technician certification in order to purchase MVAC refrigerants.
- ! maintain the following records and certifications on-site:
  - EPA equipment owner certification forms for at least one of your recovery or recovery/recycling machines;
  - certification forms for each trained technician and facility operator;
  - invoices and records documenting recovered refrigerant that required off-site reclamation, and
  - documentation of refrigerant purchases in quantities of less than 20 pounds.
- ! extract the old refrigerant from an MVAC system prior to charging the system with a new type of refrigerant.
- ! when retrofitting an MVAC system to accept a new type of refrigerant, you must change the fittings and label the MVAC system as containing the new refrigerant (such as R-134a, etc.)
- ! properly manage compressor oil recovered from MVAC systems. See the *Oil* Section in Chapter 5 for information on managing oil from MVAC systems.
- ! not use refrigerant blends or other refrigerant substitutes that have been disapproved by EPA.
- ! follow EPA regulations when converting your R-12 recovery equipment to recover R-134a or blends.
- ! follow EPA regulations when converting your R-12 recycling equipment to recycle R-134a (prohibited from converting recycling equipment for use with blends.)

R-134a:

- ! use only EPA-approved recovery or recovery/recycling equipment *
- ! recycle recovered R-134a on-site or send it to an off-site reclaimer to be purified to meet ARI Standard 700*
- ! have all MVAC technicians who repair or service R-134a systems trained and certified by an EPA-accredited training program. This training is not required if the technicians have already been certified to handle R-12. At the effective date of the final rule, the sale of R-134a will be restricted to certified technicians only (final rule expected in 1998).*

Blends:

- ! if using a blend that contains HCFC-22, you must replace the vehicle's old hoses with new, less permeable "barrier" hoses.
- ! use only EPA-approved recovery equipment, and dedicate this equipment specifically to blends and "mystery" mixtures. (Recovery equipment standards for blends are expected to be published in the summer of 1997 and equipment available by the summer of 1998.)*

- ! not recycle any of the refrigerant blends on-site. It is illegal to recycle any refrigerant blend until EPA, or an industry organization such as SAE or UL, publishes a standard for equipment designed to recycle the specific blend. However, you may send used refrigerant blends to a reclaimer.
- ! have all MVAC technicians who repair or service systems with blends trained and certified by an EPA-accredited training program. This training is not required if the technicians have already been certified to handle R-12 or R-134a. Technicians must currently be certified in order to purchase any of the blend refrigerants.*

* At the time of publishing of this manual, many of the EPA regulations pertaining to R-134a and blends were not finalized. Until the effective date of the final rule, the bullet points with asterisks fall under the "You Should" category. At the effective date of the final rule, these bullet points are expected to be requirements falling under the "You Must" category. The effective date of the final rule is expected to be in August of 1997 unless otherwise noted.

For more information on refrigerants and EPA's final rule, check the Fax-On-Demand system periodically for newly added documents or call EPA's Ozone Protection Hotline at 800/296-1996.

You Should:

- ! have separate recovery or recovery/recycling units for each of the following (if your shop encounters these refrigerants: R-12, R-134a, and all other refrigerant mixtures.
- ! follow the proposed rules for R-134a and refrigerant blends (these rules will become "musts" once the regulations are finalized.)
- ! purchase a refrigerant diagnostic tool, a leak detector, a fluorescent dye and a black light.
- ! leak-test all systems. Note that you should not pressure test or use compressed air to test R-134a systems for leaks because, when mixed with air, R-134a is combustible at elevated pressures.
- ! urge your customers to have their leaking MVAC systems repaired rather than merely topped-off. Explain to customers that MVAC refrigerants are expensive, will continue to leak if the system is not repaired, and contribute to the damage of the ozone layer.
- ! test refrigerant purity prior to recovering from a customer's system because:
  - contaminated refrigerants may damage your recovery/recycling equipment and may result in unsatisfactory performance in your customers' MVAC system.
  - mixed refrigerants cannot be recycled and are subject to IDEM's hazardous waste regulations.
- ! manage compressor oil recovered from MVAC systems according to the Used Oil Rule (see The Used Oil section in Chapter 5 for information on this rule.)
- ! puncture and label your empty refrigerant tanks and send them to a scrap metal recycler for recycling. The label should contain the following information: your shop's name, address, date the tank was punctured, and your signature.

You Should Consider:

- ! recommending to customers with vehicles manufactured prior to 1993 that damaged

MVAC systems should be retrofitted to accept an EPA-approved substitute refrigerant, such as HFC-134a.

- if your shop does not have all of the equipment needed to properly diagnose and recover the refrigerants in your customers' MVAC systems, you should consider sharing equipment with neighboring shops or referring customers to a neighboring shop that is equipped to perform MVAC work.
- before choosing to purchase and use a refrigerant blend, consider whether it is readily and widely available, the cost of buying the appropriate recovery equipment for that refrigerant, the effect the refrigerant will have on vehicle warranties, and any special retrofitting needs that must be met (such as replacing hoses with barrier hoses or installing shut-off safety switches.) Remember that EPA approves refrigerants, but does not guarantee that any refrigerant will work in a specific MVAC system.

BACKGROUND ON OPTIONS TO CONSIDER

Servicing MVAC systems has become a complicated task. Fortunately, there is a great deal of information available on MVAC refrigerants, including refrigerant blends. Prior to purchasing blends or accepting them from your customers' MVAC systems, you should research the available information to determine if your shop is prepared to purchase all of the necessary equipment and to comply with the various regulations.

If your shop is a member of an association, check with your association to see how other shops in the area are handling blends. You may be able to share equipment or work cooperatively with neighboring shops by referring customers to each other depending on the refrigerant in each customer's MVAC system.

You may obtain a variety of information, including the EPA equipment certification form, a listing of organizations with EPA-accredited training programs, and EPA-approved third party refrigerant reclaimers by calling the Stratospheric Ozone Hotline at (800) 296-1996. You may also obtain information from EPA's auto air conditioning world wide web site:

http://www.epa.gov/ozone/title6/609
